DRINKING WATER SOURCE PROTECTION PLAN

Golden Spike National Historic Site

April 1999

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WATER RESOURCES DIVISION

National Park Service - Department of the Interior
Fort Collins - Denver - Washington

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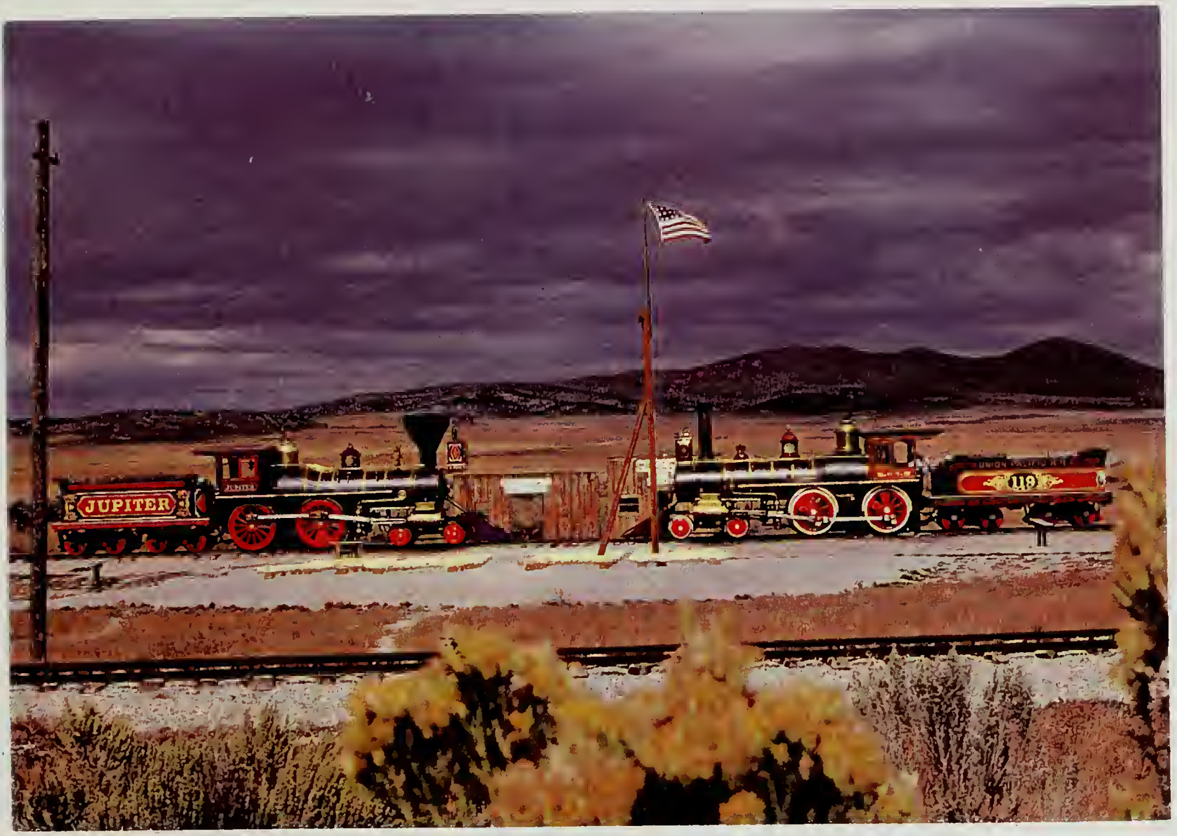

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EXECUTIVE SUMMARY

Golden Spike National Historic Site obtains its water from a deep well located about ¼ mile east of the Visitor Center. The well is completed in a limestone bedrock aquifer which is overlain by 370 feet of unconsolidated, mostly clay, material.

Available information does not allow us to delineate the area of groundwater flow to the well for various time periods, as prescribed by Utah Division of Drinking Water. Hydrologic data is inadequate to determine even the direction of groundwater flow. Therefore, we used the optional two-mile radius for developing this drinking water source protection plan.

There are few potential contaminants in the area. The only potential contaminant source not under the direct control of the National Park Service is an area of dryland wheat farming about a mile north of the well site. Potential contaminants at the park are adequately controlled through a combination of regulatory, operational, physical, and negligible quantity controls.

The aquifer is further protected from contamination by a protective blanket of mostly clay material which is 370 feet thick. It is extremely unlikely that any contaminant spill could be so large or so prolonged as to allow infiltration through 370 feet of clay overburden.

This document also serves as a repository for information related to construction and testing of the well. Information not normally in a source water protection plan is included throughout the document to provide a complete history of this particular well and the general hydrogeologic conditions at Golden Spike National Historic Site. Miscellaneous documents providing information about the well are included in the appendices.

1.0 INTRODUCTION

Golden Spike National Historic Site marks the location of the meeting of the Union Pacific and Central Pacific Railroads to complete the first transcontinental railroad in 1869. The site is 32 miles west of Brigham City, Utah. The location is shown on the map in Figure 1.

1.1 System Information:

National Park Service
Golden Spike National Historic Site
Utah DEQ Number 02026

This is a transient, non-community public water supply system. The well was constructed in 1967 and has been in use continuously since then.

1.2 Source Information:

There is only one drinking water supply well at Golden Spike National Historic Site. The well was constructed in 1967 and has been the sole source of water since then. The well is located approximately ¼ mile east of the visitor center. The land survey location is (B-10-6) 9bbb-2.

Water is used for drinking and restroom facilities for approximately 50,000 visitors per year. There are 12 permanent employees at the park. There is one single-family residence at the park. The well is also used to supply water for the steam locomotives.

Water usage records for the past three years indicates that peak usage occurs in June, July, and August. Peak usage is 250-275,000 gallons per month. Average daily use for the peak month is approximately 9000 gallons per day. Water usage for 1996-98 is shown in Table 1 and Figures 2 and 3.

1.3 Designated Person - R309-113-5:

Owner:	National Park Service
Superintendent:	Bruce Powell Phone: (435)-471-2209
Operator:	Steve Romero Phone: (435)-471-2209
Address:	P.O. Box 897 Brigham City, UT 84302

2.0 THE DELINEATION REPORT - R309-113-9(5)

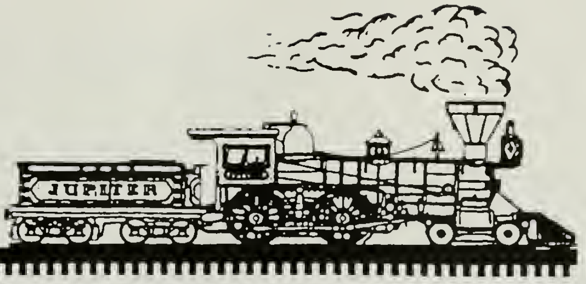
The primary sources of hydrogeologic information for this project are two reports by the U.S. Geological Survey. One report is an administrative report from the USGS to the National Park Service (Price, 1968) describing the construction and testing of the well in 1967. The other report (Hood, 1972) is a hydrologic reconnaissance of the Promontory Mountains conducted in cooperation with Utah Department of Natural Resources.

2.1 Geologic Data - R309-113-9(5)(a)(i):

Hydrogeology

The lithologic log of this well, based on cuttings collected at 5-foot intervals, is included as Table 2. Drilling penetrated about 370 feet of low permeability, unconsolidated material consisting of mostly clay, with some sand and gravel. This material is alluvium and colluvium derived from erosion and weathering

GETTING THERE



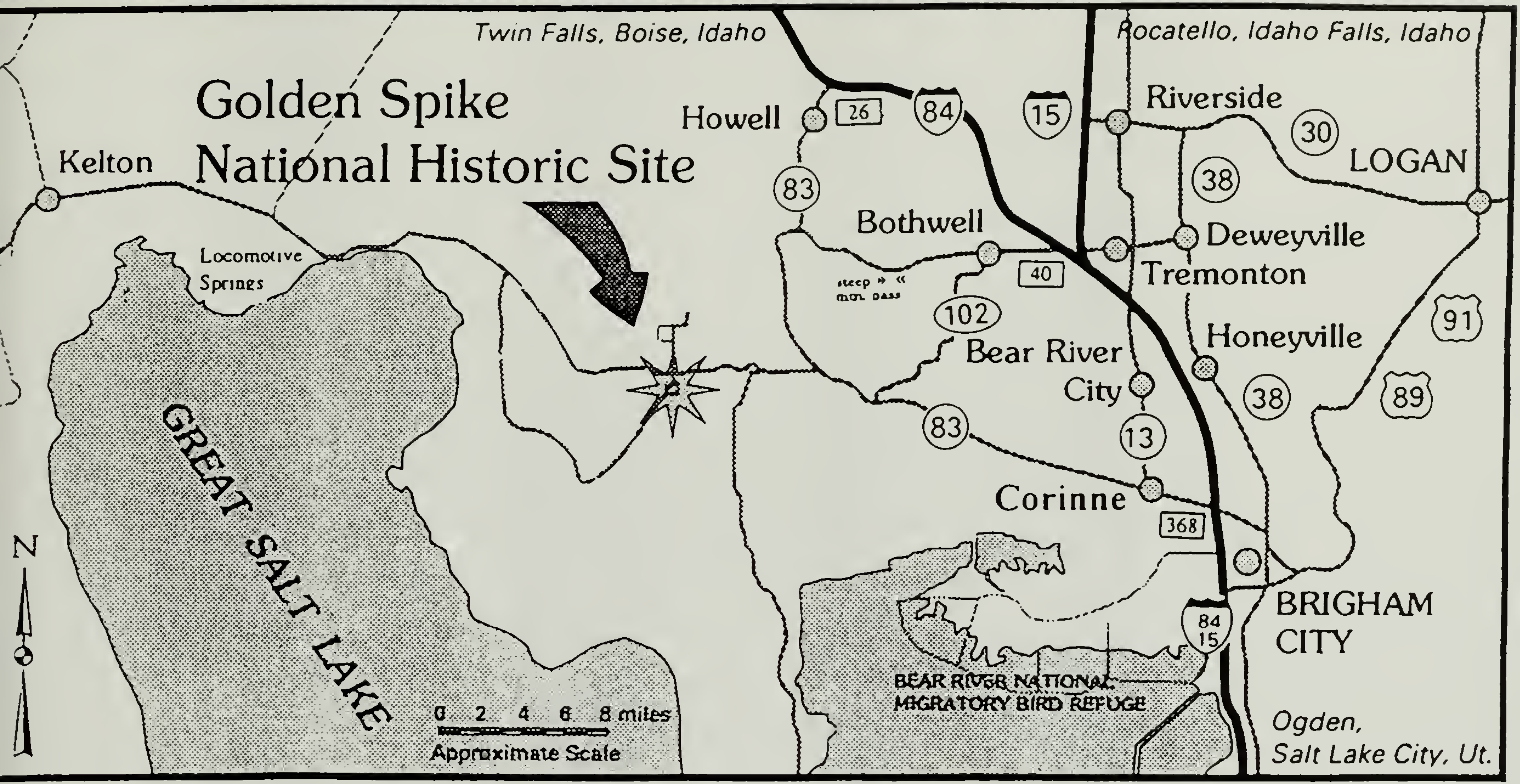


Figure 1. General location map

Potable Water Use Data			
Golden Spike National Historic Site			
	Meter reading at beginning of month	Monthly water use Gallons	Average Daily Use Gallons
01/01/1996	8,118,600	42,411	1,368
02/01/1996	8,161,011	9,089	325
03/01/1996	8,170,100	12,700	410
04/01/1996	8,182,800	20,400	680
05/01/1996	8,203,200	149,200	4,813
06/01/1996	8,352,400	215,900	7,197
07/01/1996	8,568,300	277,100	8,939
08/01/1996	8,845,400	258,400	8,335
09/01/1996	9,103,800	177,600	5,920
10/01/1996	9,281,400	60,000	1,935
11/01/1996	9,341,400	61,400	2,047
12/01/1996	9,402,800	79,700	2,571
01/01/1997	9,482,500	72,600	2,342
02/01/1997	9,555,100	53,100	1,896
03/01/1997	9,608,200	65,600	2,116
04/01/1997	9,673,800	60,900	2,030
05/01/1997	9,734,700	96,400	3,110
06/01/1997	9,831,100	196,600	6,553
07/01/1997	10,027,700	224,000	7,226
08/01/1997	10,251,700	239,200	7,716
09/01/1997	10,490,900	217,000	7,233
10/01/1997	10,707,900	65,700	2,119
11/01/1997	10,773,600	31,100	1,037
12/01/1997	10,804,700	73,500	2,371
01/01/1998	10,878,200	53,100	1,713
02/01/1998	10,931,300	44,300	1,582
03/01/1998	10,975,600	54,000	1,742
04/01/1998	11,029,600	80,800	2,693
05/01/1998	11,110,400	135,900	4,384
06/01/1998	11,246,300	130,600	4,353
07/01/1998	11,376,900	254,500	8,210
08/01/1998	11,631,400	250,600	8,084
09/01/1998	11,882,000	200,100	6,670
10/01/1998	12,082,100	61,900	1,997
11/01/1998	12,144,000	28,100	937
12/01/1998	12,172,100	43,200	1,394
01/01/1999	12,215,300		
	Average	113,797	3,724

Table 1. Potable water use

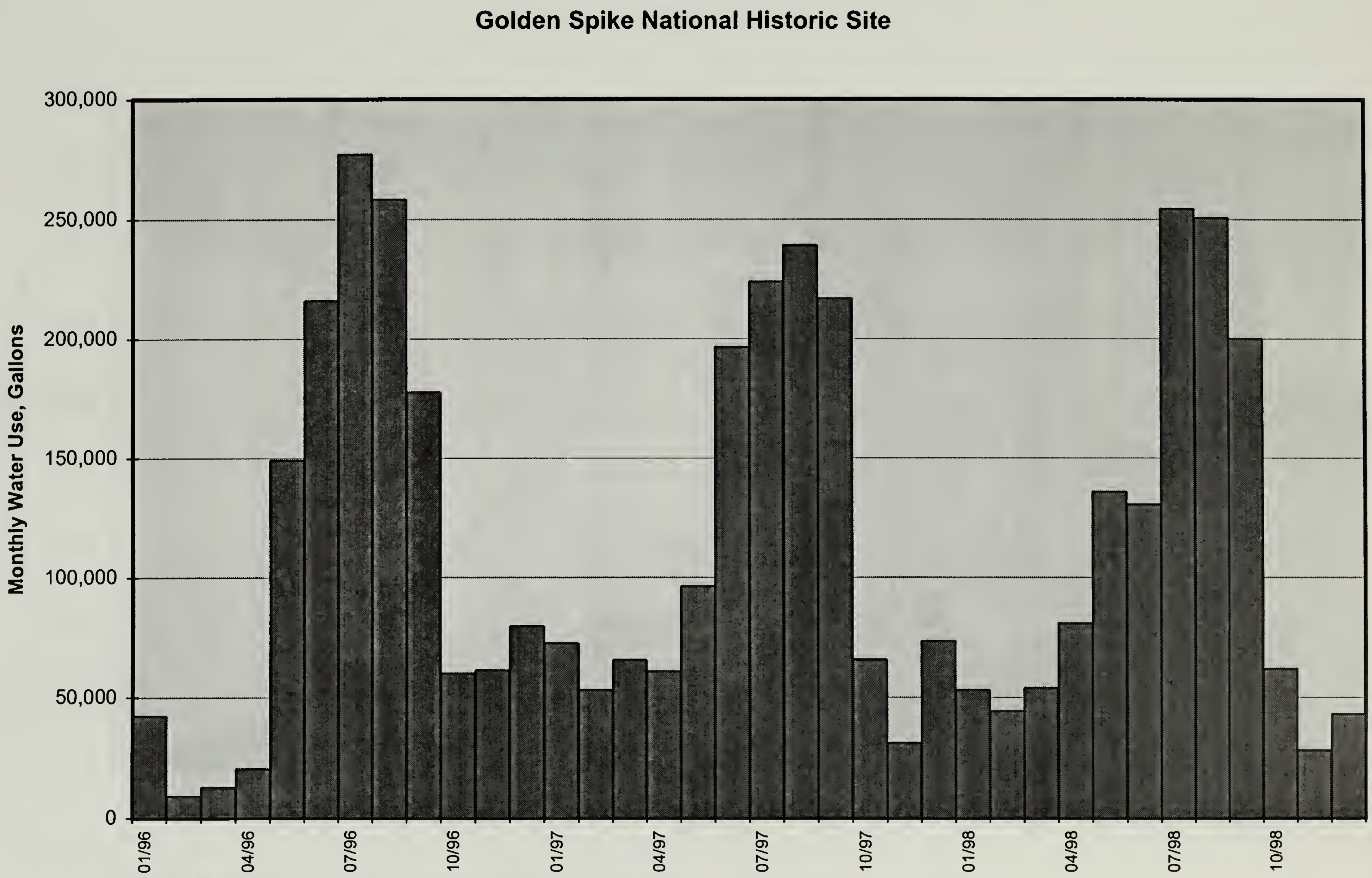


Figure 2. Monthly water use, 1996-98

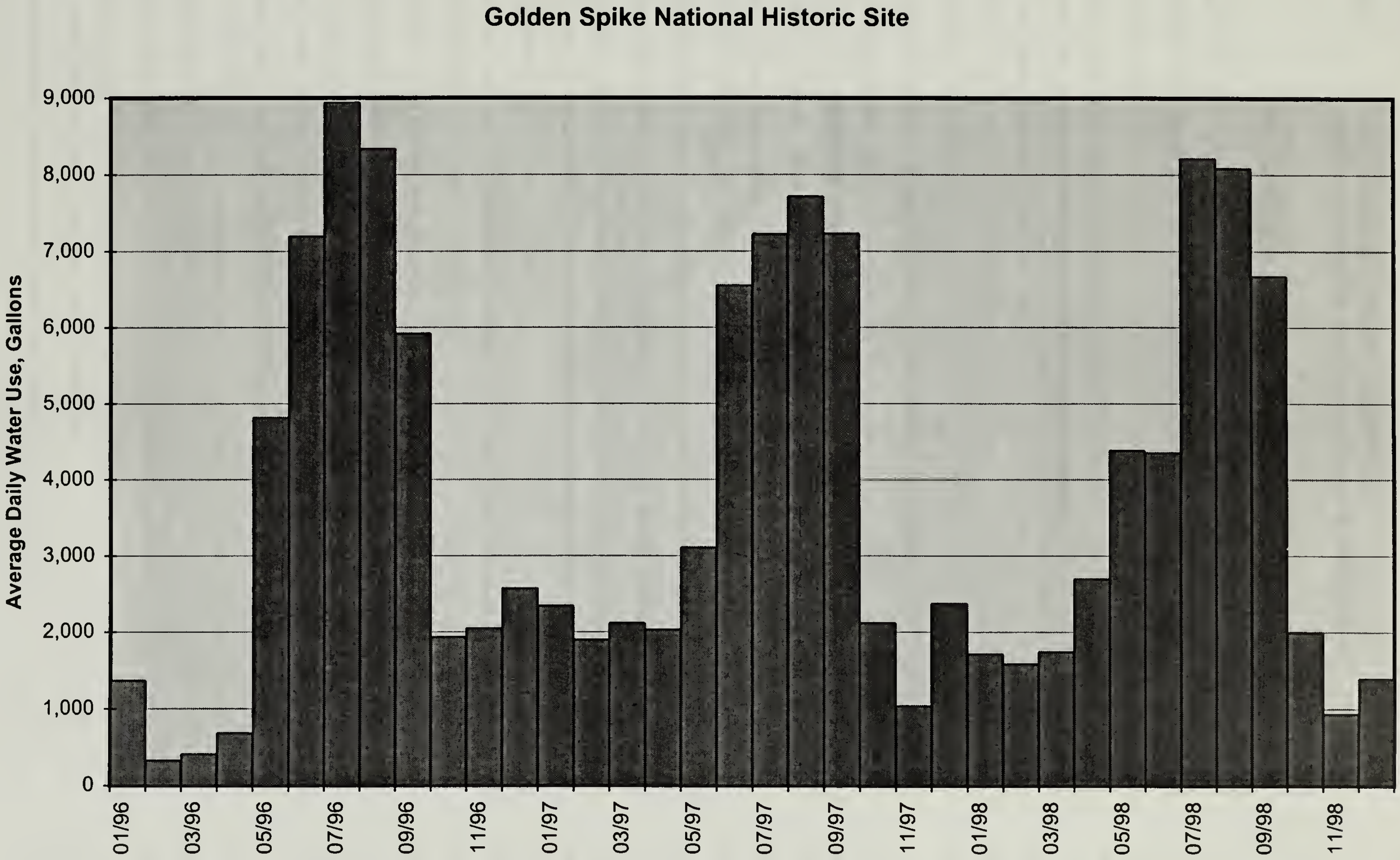


Figure 3. Average daily water use, 1996-98

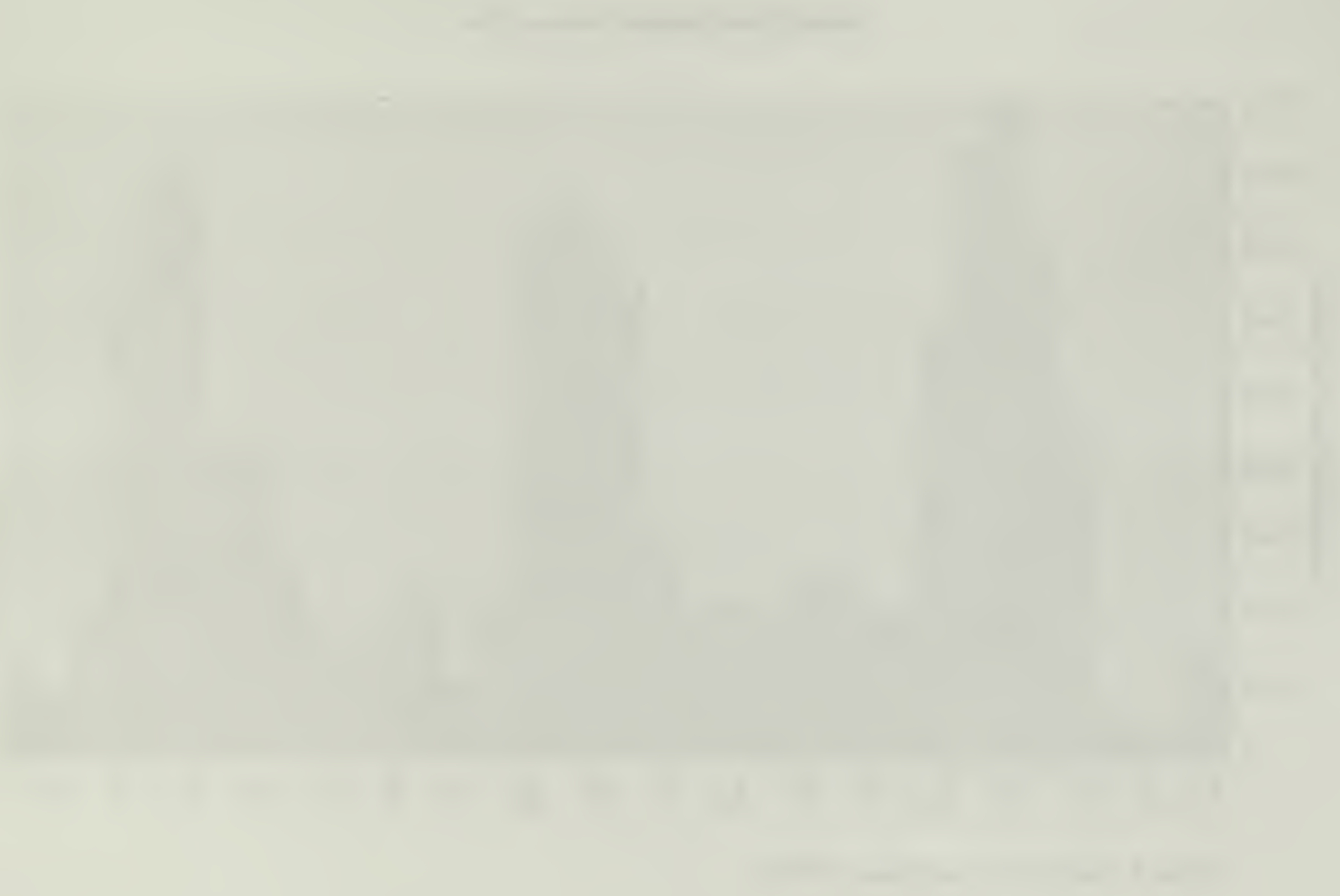


Table 2. **Lithologic Log of Well (B-10-6) 9bbb-2, Golden Spike National Historic Site Water Supply Well.**

Material	Thickness feet	Depth feet
Topsoil and clay, light brown	15	15
Clay, tan: some small fragments of limestone and quartzite	20	35
Clay, tan, silty	5	40
Clay, tan; some fragments of limestone and quartzite	20	60
Gravel, fine to medium, fairly well rounded; mostly limestone with some quartzite; some tan clay	5	65
Clay, tan; some fragments of limestone and quartzite	25	90
Clay, gravel, and boulders	5	95
Gravel and boulders, mostly limestone; some calcium carbonate cement; some clay	5	100
Clay, tan with fragments of limestone; some boulders	75	175
Clay and sand; very little gravel	10	185
Clay and sand; some gravel	15	200
Clay and sand; some gravel; soft, dry	5	205
Clay, tan, and sand; some gravel fragments of mostly limestone	35	240
Gravel; some cobbles; very little clay; gravel and cobbles, mostly limestone	5	245
Gravel and clay	5	250
Clay, grayish brown, hard; some gravel fragments of mostly limestone	30	280
Clay, grayish brown, soft, and sand	10	290
Clay and sand; some limestone fragments	25	315
Clay, tan, and sand, soft; very little gravel	15	330
Clay, tan; some gravel and cobbles	5	335
Gravel and boulders; mostly limestone	10	345
Clay, gray, and gravel; mostly limestone, some quartzite	5	350
Clay, grayish brown, with some gravel	20	370
Gravel, fine to medium, mostly limestone with some quartzite; some gray clay	5	375
Gravel and clay; gravel mostly limestone	5	380
Gravel, some clay	5	385
Gravel, mostly limestone with calcium carbonate cement, some red and white quartzite; some volcanic tuff	8	393
Limestone, solid; yields warmer water than overlying gravel aquifer	30	423

of the adjacent Promontory Mountains as they were uplifted. Water is obtained from a saturated gravel layer at the base of the unconsolidated material and Paleozoic limestone bedrock below 385 feet.

The USGS (Price, 1968) interprets the hydrogeology of the well as obtaining water from two aquifers; a gravel aquifer from 370-385 feet below ground surface and limestone bedrock from 393-423 feet below ground surface. There is a transition zone from 385-393 feet below ground surface, described as “gravel, mostly limestone with calcium carbonate cement, some red and white quartzite, some volcanic tuff”. The description of the transition zone is not that of a confining unit. Hydrogeologically, the gravel and limestone probably act as one aquifer, as there are no clay layers indicated in either the driller’s log or geophysical log.

A thick sequence of clay overlies the gravel and limestone aquifer. Although the clay is mixed with sand and gravel, clay is the dominant feature through most of the 370 feet of sediment overlying the aquifer. The clay probably prevents water and any contaminants that might be found near the well from percolating down to the aquifer. Recharge to the aquifer probably occurs from infiltration of precipitation and snowmelt in areas of the Promontory Mountains where the Paleozoic limestone outcrops, about 1 mile southeast of the well. A northwest-southeast hydrogeologic cross section of the area is shown in Figure 4.

Water Quality

Water quality samples were collected from the well during the testing in 1967. Subsequent sampling in 1974, 1991, and 1993 shows no change in water quality. The sample collected in 1991 was analyzed for a suite of volatile organic compounds, but none were found above detection limits. Chemical analyses are summarized in Table 3.

The analyses indicate that the water is chemically suitable for domestic use and meets Utah state standards for drinking water. Concentrations of chloride and total dissolved solids exceed the recommended maximum allowable limits (250 and 500 mg/l respectively). However, the recommended limits pertain mainly to their effect on the taste of the water, rather than health concerns. The water is very hard and needs to be treated prior to using it in steam locomotives.

Table 3. General water quality.

Date	5/12/67	6/2/67	12/11/74	12/16/91	12/21/93
Ca (mg/l)	85	82	104	100	100
Mg (mg/l)	31	33	24	34	34
Na (mg/l)		96	95	100	99
K (mg/l)		23	24	24	24
HCO_3 (mg/l)	178	176	186	168	172
CO_3 (mg/l)	0	0	0	0	0
SO_4 (mg/l)		38	50	42	29
Cl (mg/l)	265	265	300	330	325
NO_3 (mg/l)		3.8	1.9	1.9	2.2
TDS (mg/l)	814	852	808	866	834
Hardness ($CaCO_3$)	339	340	360	389	389
Spec. Cond. (umhos)	1190	1190	1260	1290	1355
pH	7.5	7.5	6.9	7.6	7.2

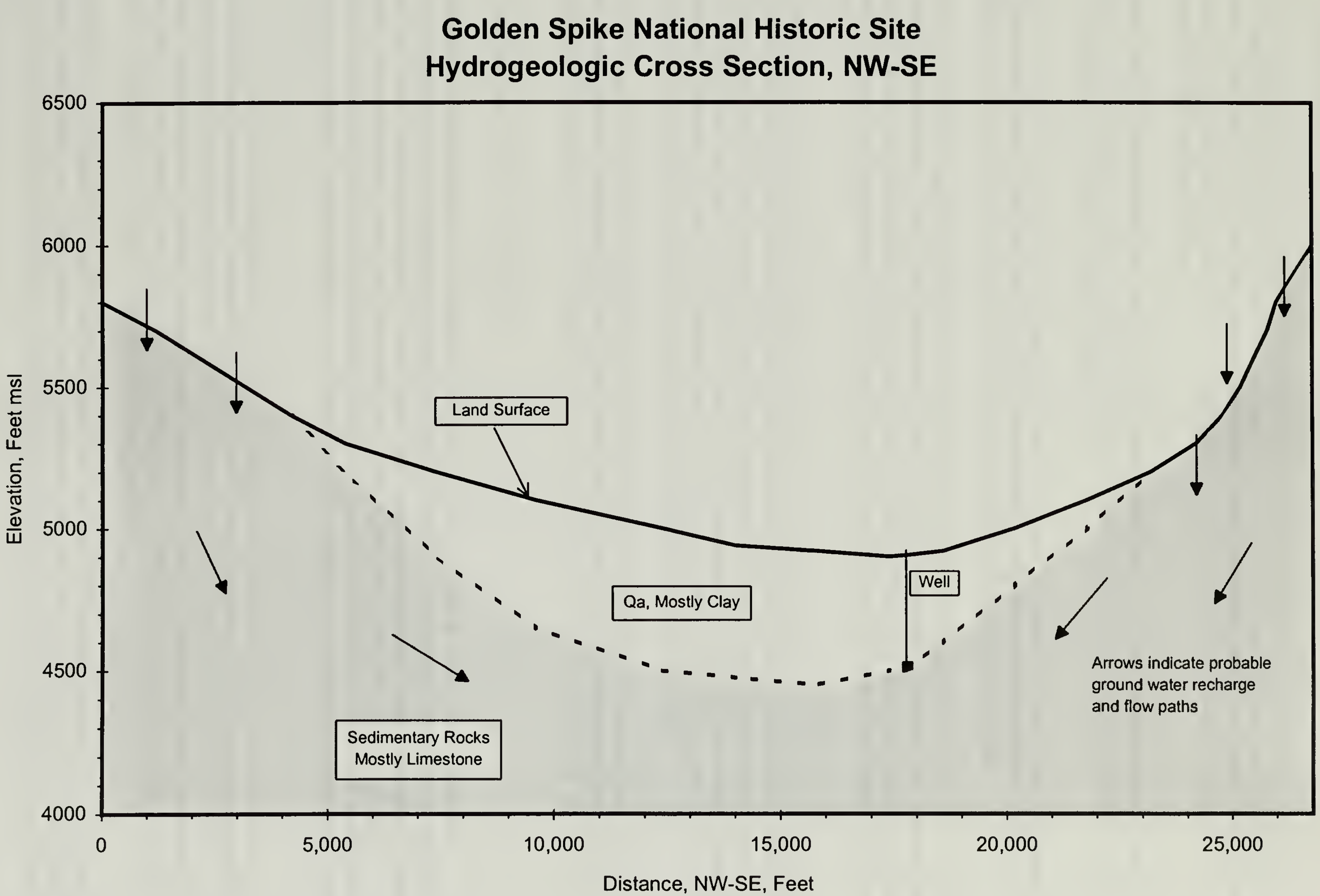


Figure 4. Hydrogeologic Cross Section

2.2 Well Construction Data - R309-113-9(5)(a)(ii) & (iii):

The US Geological Survey conducted a preliminary 1-day reconnaissance in August 1966 to determine the feasibility of obtaining groundwater at the site and provided technical assistance during drilling and testing of the well. Drilling and test pumping were done during the period April 27 to June 2, 1967 by the Binning Drilling Company of Payson, Utah. Lester Binning, the driller, collected drill cutting samples and assisted in test pumping the well.

Cable tool drilling equipment was used to drill and develop the well. A 16-inch diameter steel conductor pipe was set to a depth of 10 feet. An 8-inch uncased hole was drilled to 423 feet below ground surface. Drill cuttings were collected at 5-foot intervals.

The first water-bearing material penetrated by the well was a layer of gravel with some clay and volcanic tuff between depths of 385-393 feet. This layer immediately overlies the limestone bedrock. During drilling of the gravel layer, the water level remained about 383 feet below ground surface.

When the limestone was being drilled, the driller reported the water level had risen about 3 feet to 380 feet below ground surface. Drilling was stopped at a depth of 423 feet because it appeared that an adequate supply of water might be obtained from the gravel and limestone. There was also some concern that the quality of water might deteriorate with depth because many mineral springs issue from limestone in the region.

Six-inch diameter steel casing was placed in the well from 2½ feet above ground to 423 feet below ground surface. The casing is butt welded and has a steel plate welded on the bottom. Perforations consist of 240 torch cut slots 1/8-inch wide and 6 inches long, staggered around the casing between 383 and 413 feet below ground surface. To complete the well, a 1-inch envelope of fine gravel was placed around the outside of the casing opposite the perforated interval. Clay was poured on top of the gravel to within 15 feet of the land surface. Cement was poured on top of the clay to form a surface seal.

The well was developed by surging with a 5-inch diameter bailer and bailing the fine materials from the well. This operation lasted about 6 hours, after which the water bailed from the well was nearly free of sediment. The water level in the completed well was 378.54 feet below ground surface on May 19, 1967.

2.3 Aquifer Data - R309-113-9(5)(a)(iv):

Drawdown and yield testing were conducted from May 31 through June 2, 1967. A 5 horsepower submersible pump was installed in the well at a depth of 413 feet. The discharge line was 1½-inch pipe equipped with an adjustable valve at the well head. Discharge measurements were made with a 5-gallon bucket and a stopwatch. Water level measurements were made with an electric tape. An electrical conductivity cell and thermometer were used to check for possible changes in the chemical quality of the water during testing. Measurements of yield, water level, temperature, and field conductivity are provided in Table 4.

The performance test lasted about 47 hours, but pumping was briefly interrupted 3 times so that the generator could be serviced. Because of this, there are 4 pumping periods. The pumping periods lasted about 7 hours, 14 hours, 20 hours, and 6 hours. The first 2 non-pumping periods lasted 20 minutes, during which water level recovery measurements were made. Only 1 measurement was made during the third non-pumping period, which was only 5 minutes long. A hydrograph of water level measurements during the pumping and recovery periods is shown in Figure 5.

The first pumping period was conducted as a step-drawdown test with pumping rates of 10, 15, 20, and 27 gallons per minute (gpm). The last step, and subsequent pumping periods, were apparently conducted with the control valve fully open to allow maximum production from the well. Pumping rates during each of

Table 4. Performance test data, May 31 - June 2, 1967

Golden Spike NHS		First Pumping Period				
	Total Elapsed Time, Minutes	Minutes	Water Level Feet BGS	Q gpm	Temperature °F	Conductivity micromhos
05/31/1967 14:10	0.0	0.0	377.85			
	0.3	0.3	378.55	8		
	0.7	0.7	379.05	8		
	0.8	0.8	379.25	8		
	1.0	1.0	379.50	10		
	5.0	5	379.79	10		
	10.0	10	379.87	10		
	15.0	15	379.85	10		
	30.0	30	379.90	10	73	1200
	40.0	40	379.94	10		
	50.0	50	379.90	10	73	1200
	60.0	60	379.94	10		
	65.0	65	382.50	15		
	67.0	67	382.55	15		
	80.0	80	382.50	15	73	1200
	95.0	95	383.15	15	72.5	1200
	120.0	120	383.05	15	72.5	1200
	124.0	124	385.12	20		
	127.0	127	385.42	20	72	1200
	129.0	129	385.19	20	72	1200
	136.0	136	385.53	20		
	155.0	155	385.53	20	72	1200
	165.0	165	385.53	20	72	1200
	180.0	180	385.53	20	72	1200
	192.0	192	391.23	25	71	1200
	200.0	200	391.98	27	71	1200
	210.0	210	391.13	27		
	213.0	213	393.70	27		
	250.0	250	396.33	27	71	1200
	260.0	260	396.28	27		
	275.0	275	396.36	27		1200
	300.0	300	396.34	25		
	360.0	360	396.31	24.6	71	1200
	380.0	380	396.40	24.6	71	1100
	385.0	385	396.34			
05/31/1967 21:00	410.0	410	396.29	24.6	71	1200

BGS = Below Ground Surface
Q = Pumping Rate
gpm = gallons per minute

Table 4. Performance test data, May 31 - June 2, 1967

Golden Spike NHS		First Recovery Period				
	Total Elapsed		Water Level	Q	Temperature	Conductivity
	Time, Minutes	Minutes	Feet BGS	gpm	°F	micromhos
05/31/1967 21:00	410.0	0.0	396.29			
	412.8	2.8	394.42			
	413.0	3.0	393.37			
	413.5	3.5	392.04			
	414.5	4.5	390.70			
	415.0	5.0	388.88			
	415.5	5.5	386.60			
	416.0	6.0	385.24			
	417.0	7.0	383.03			
	417.5	7.5	382.04			
	418.3	8.3	381.03			
	419.0	9.0	380.02			
	420.0	10.0	379.49			
	421.5	11.5	379.68			

BGS = Below Ground Surface
Q = Pumping Rate
gpm = gallons per minute

Table 4. Performance test data, May 31 - June 2, 1967

Golden Spike NHS		Second Pumping Period				
	Total Elapsed		Water Level	Q	Temperature	Conductivity
	Time, Minutes	Minutes	Feet BGS	gpm	°F	micromhos
05/31/1967 21:20	430.0	0.0				
	432.0	2	386.50			
	435.0	5	387.92			
	437.0	7	388.71			
	438.0	8	390.35	27		
	440.0	10	392.98	27		
	450.0	20	394.66	27		
	458.0	28	396.37			
	500.0	70	396.37	27	71.5	1200
	570.0	140	396.28	27	71.5	1200
	695.0	265	396.28			
	770.0	340	396.30	24	71.5	1200
	840.0	410	396.30	24		
	875.0	445	396.32	24		
	920.0	490	396.34	25	71	
	960.0	530	396.60	23	71	
	1070.0	640	396.20	24	71	
	1250.0	820	396.65		71.5	
06/01/1967 11:40	1290.0	860	397.18			
Golden Spike NHS		Second Recovery Period				
	Total Elapsed		Water Level	Q	Temperature	Conductivity
	Time, Minutes	Minutes	Feet BGS	gpm	°F	micromhos
06/01/1967 11:40	1290.0	0.0	397.18			
	1292.4	2.4	396.18			
	1292.9	2.9	395.18			
	1293.3	3.3	394.18			
	1293.6	3.6	393.18			
	1294.0	4.0	392.18			
	1294.3	4.3	391.18			
	1294.7	4.7	390.18			
	1295.0	5.0	389.18			
	1295.3	5.3	388.18			
	1295.6	5.6	387.18			
	1296.0	6.0	386.18			
	1296.4	6.4	385.18			
	1296.9	6.9	384.18			
	1297.3	7.3	383.18			
	1297.9	7.9	382.18			
	1298.6	8.6	381.18			
	1299.8	9.8	379.18			
06/01/1967 12:00	1310.0	20.0	378.88			

BGS = Below Ground Surface
Q = Pumping Rate
gpm = gallons per minute

Table 4. Performance test data, May 31 - June 2, 1967

Golden Spike NHS		Third Pumping Period				
	Total Elapsed		Water Level	Q	Temperature	Conductivity
	Time, Minutes	Minutes	Feet BGS	gpm	°F	micromhos
06/01/1967 12:00	1310.0	0.0	378.88			
	1310.2	0.2	379.88			
	1310.4	0.4	380.88			
	1310.7	0.7	381.88			
	1311.0	1.0	382.88			
	1311.3	1.3	383.88			
	1311.9	1.9	384.88			
	1312.4	2.4	385.88			
	1313.0	3.0	386.88			
	1313.5	3.5	387.88			
	1314.2	4.2	388.88			
	1315.1	5.1	389.88			
	1316.1	6.1	390.88			
	1317.9	7.9	391.88			
	1320.6	10.6	392.88			
	1321.3	11.3	393.88	27		
	1360.0	50	396.69	25	71.5	1150
	1400.0	90	396.88	25		
	1430.0	120	396.35	24		
	1440.0	130	396.35	24	71	1200
	1475.0	165	396.35	24		
	1500.0	190	396.37	24		
	1525.0	215	396.38	23		
	1595.0	285	396.28	25	71	1150
	1720.0	410	396.65	23		
	1770.0	460	396.33	24		
	1845.0	535	397.28	23		
	1880.0	570	396.37	23		
	1945.0	635	396.62	23		
	2000.0	690	396.86	22		
	2060.0	750	396.32	22		
	2180.0	870	396.36	21		
	2300.0	990	396.45			
	2395.0	1085	396.32	24	71	1200
	2485.0	1175	396.69	23		
06/02/1967 7:45	2495.0	1185	Pump Off		Pump Off	
Golden Spike NHS		Fourth Pumping Period				
	Total Elapsed		Water Level	Q	Temperature	Conductivity
	Time, Minutes	Minutes	Feet BGS	gpm	°F	micromhos
06/02/1967 7:50	2500	0	380.32			
	2580	80	396.2	24		
	2670	170	396.1	21		
	2750	250	396.4	22		
	2815	315	396.25	24	71	
06/02/1967 13:45	2855	355				

BGS = Below Ground Surface
Q = Pumping Rate
gpm = gallons per minute

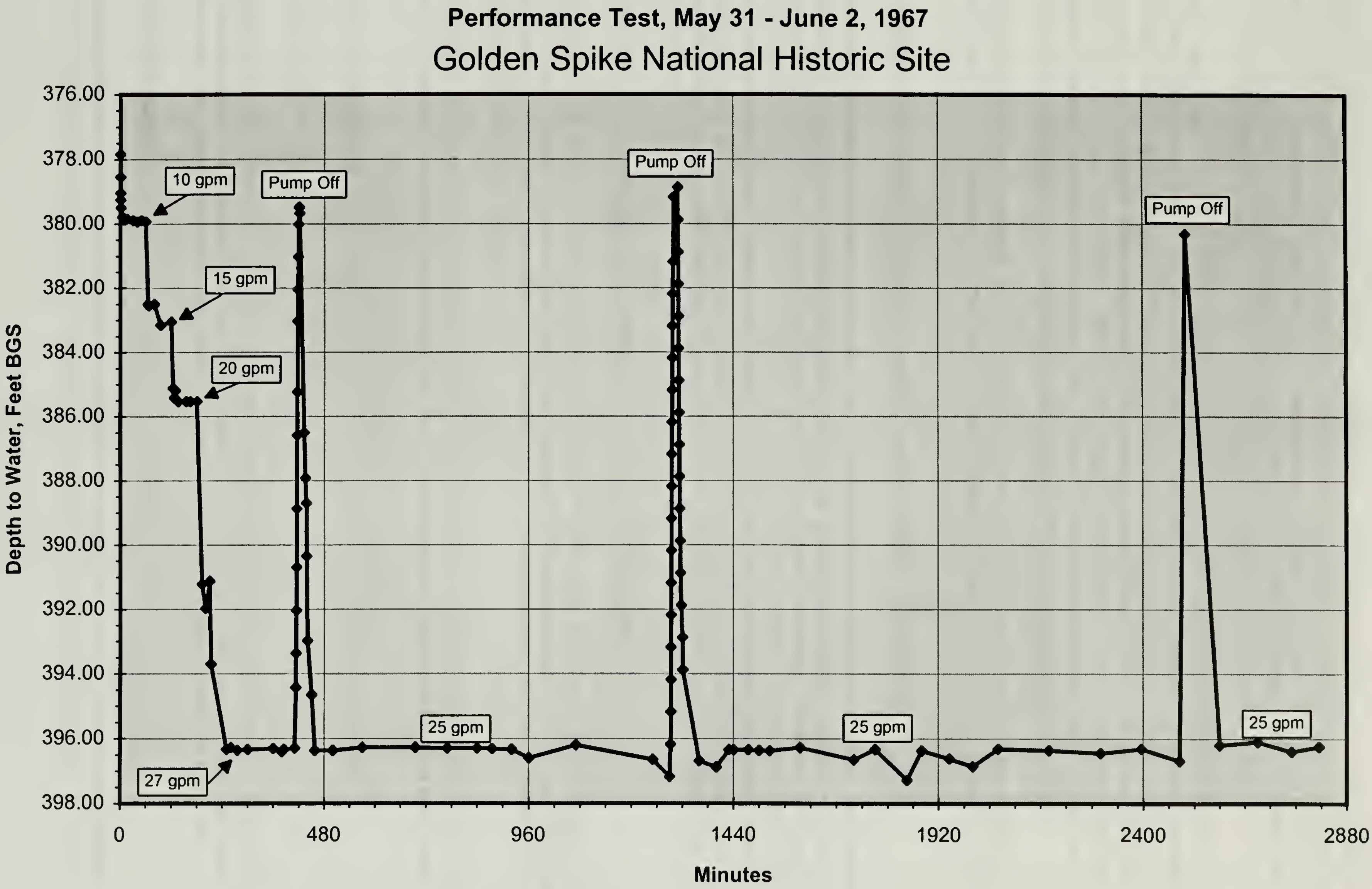


Figure 4. Hydrograph of performance test, May 31 - June 2, 1967

these time periods was initially about 27 gpm, gradually decreasing to about 24 gpm. This pumping rate reflects limits of the pump and not the aquifer. Water level during each pumping period was drawn down about 18 feet to about 396.5 feet below ground surface and remained constant throughout the duration of pumping. Water levels recovered to very near static levels (377.8 feet bgs) within about 10 minutes of cessation of pumping.

The average specific capacity of the well during each pumping period, after the drawdown had essentially stabilized at 396.5 feet below ground surface, was 1.3 gpm per foot of drawdown. It was not possible to calculate hydraulic characteristics of the aquifer from the data collected during this test. There were no observation wells in which to measure water level changes at any distance from the pumped the well, a situation which remains unchanged. Water levels stabilized after about 15-20 minutes of pumping and remained constant for the duration of each test. Recovery measurements were taken for only about 10 minutes, after which the water level had very nearly returned to the pre-pumping (static) level.

Specific conductivity of the water remained nearly constant at about 1,200 micromhos per centimeter during the 47 hours of testing. Temperature varied only slightly between 73°F and 71°F during the tests.

2.4 Hydrogeologic Methods, Procedures, and Calculations - R309-113-9(5)(a)(vii):

Data collected during the testing of the well in 1967 are not suitable for computation of aquifer parameters; transmissivity, hydraulic conductivity, or storage coefficient. No additional monitor wells have been constructed in the area and the pumping capabilities are essentially the same. Therefore, conducting a new performance test would not provide data that could be used to calculate aquifer characteristics. There are insufficient wells in the area to determine the direction of groundwater flow. Since the area is remote, there are few potential contaminant sources, and the aquifer is protected by a thick sequence of predominantly clay materials; the optional two-mile radius delineation will be used to delineate the wellhead protection area.

2.5 Map Showing Boundaries of the DWSP Zones - R309-113-9(5)(a)(viii):

Figure 6 is a map showing the area within two miles of the supply well. The map is a composite of USGS 1:24,000 scale maps for the northeast part of the Golden Spike National Monument 7.5' quadrangle and the southeast part of the Sunset Pass 7.5' quadrangle. Land ownership and land use within the two-mile radius are also shown on Figure 6.

The 100-foot radius for Zone 1 is not show on the map. There are no potential contaminant sources within Zone 1. Location of potential contaminant sources within two miles of the well are shown on Figure 7

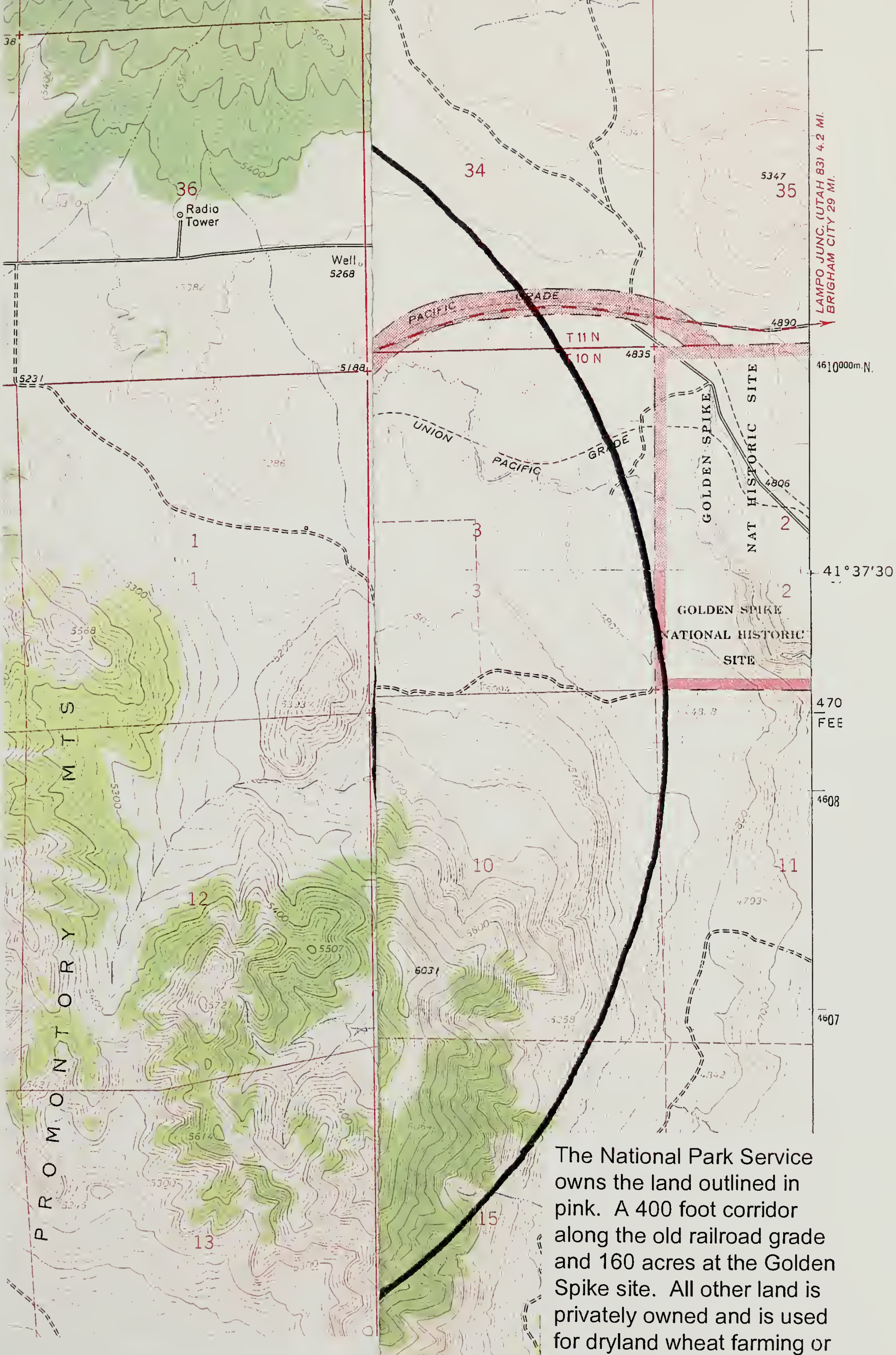
3.0 THE INVENTORY OF POTENTIAL CONTAMINATION SOURCES - R309-113-10

3.1 List Possible Potential Contamination Sources - R309-113-10(1):

Possible potential contaminant sources within two miles of the well include; other water supply wells (active and abandoned), sewer lines and septic leachfields, fuel tanks at the park, the maintenance shop at the park, and agricultural chemicals which may be used on the farmland adjacent to the park.

3.2 Identify Hazards:

Potential contaminant sources, hazardous substances associated with each of the possible potential contaminant sources, and approximate quantities of each hazardous substance are listed in Table 5.



The National Park Service owns the land outlined in pink. A 400 foot corridor along the old railroad grade and 160 acres at the Golden Spike site. All other land is privately owned and is used for dryland wheat farming or cattle grazing.

Figure 6. Land use and land ownership within t

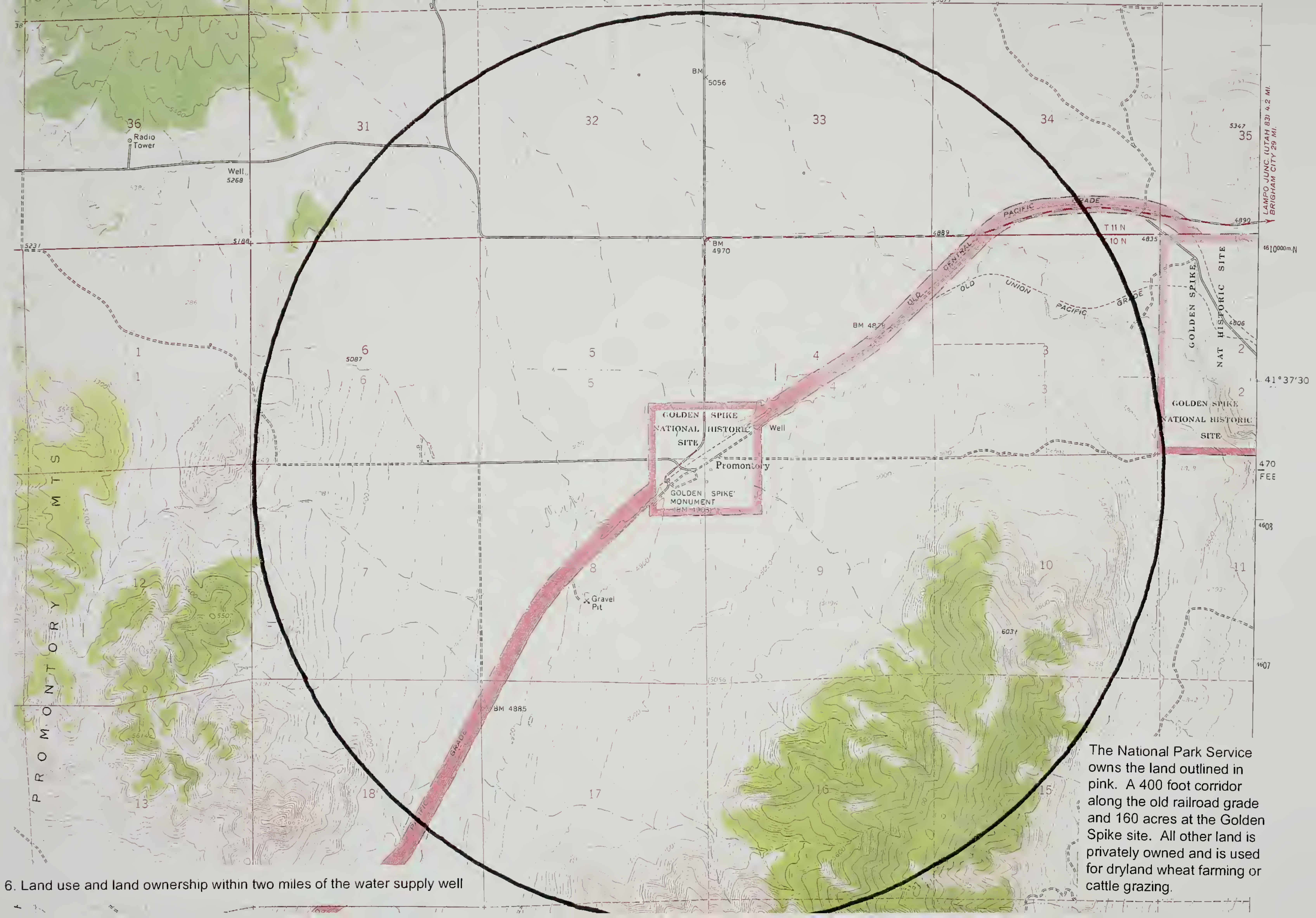


Figure 6. Land use and land ownership within two miles of the water supply well

The National Park Service owns the land outlined in pink. A 400 foot corridor along the old railroad grade and 160 acres at the Golden Spike site. All other land is privately owned and is used for dryland wheat farming or cattle grazing.

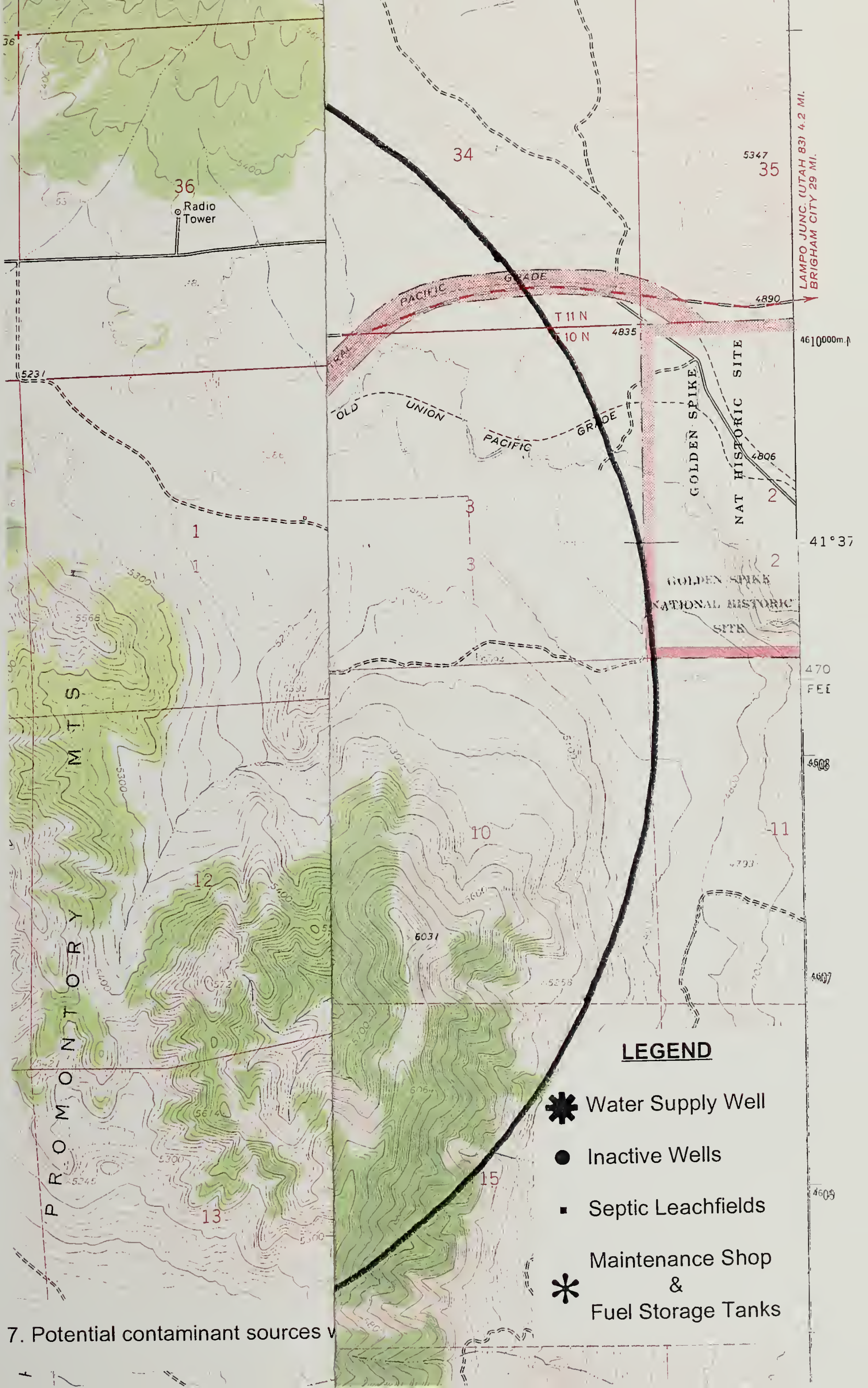


Figure 7. Potential contaminant sources v

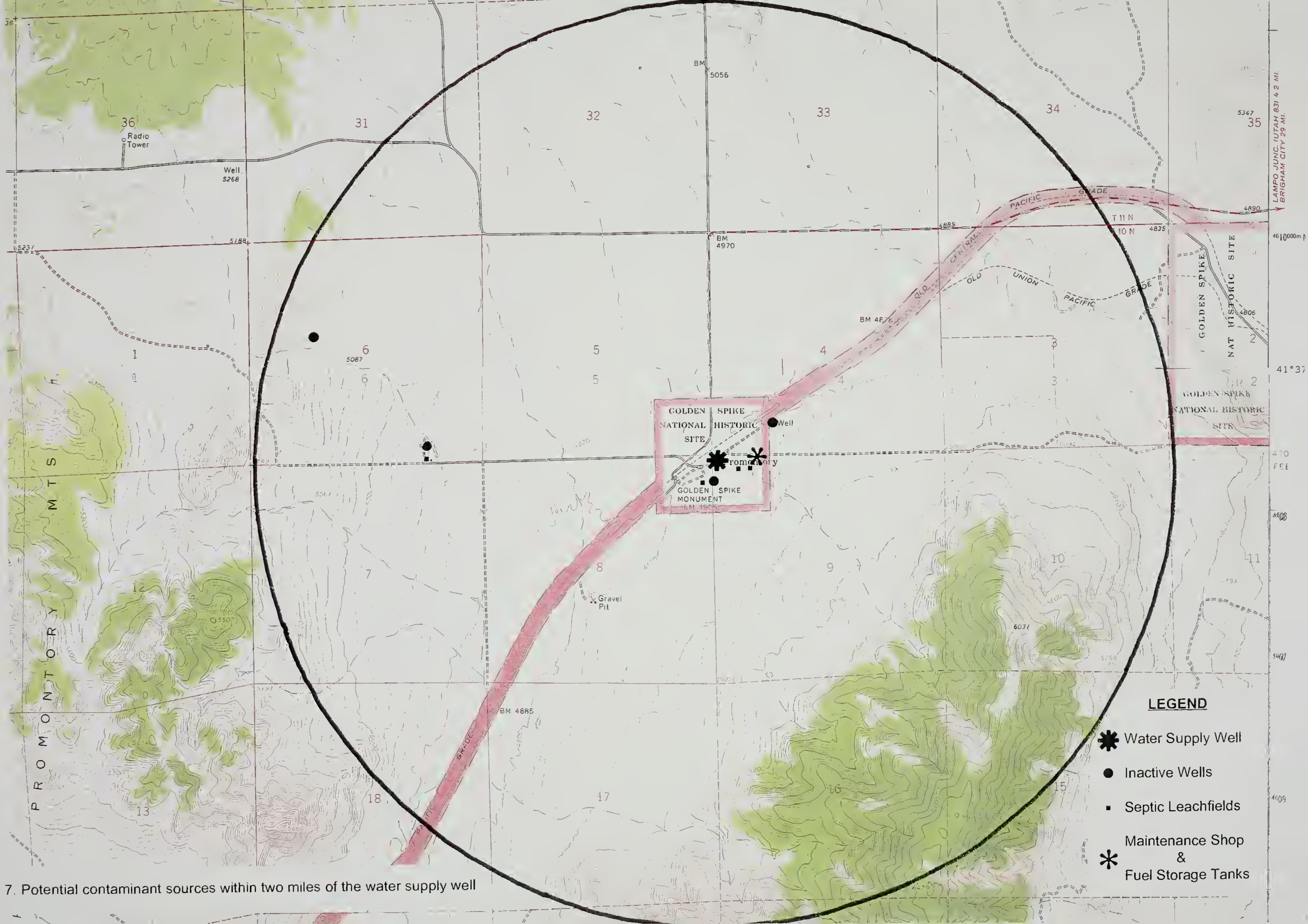


Figure 7. Potential contaminant sources within two miles of the water supply well

Table 5. Hazardous substances associated with each potential contaminant source

Potential Source	Hazardous Substances	Approximate Quantity
Inactive wells	Surface runoff	Four wells. Two near the park's water supply well and two at a ranch 1 mile west of the park.
Sewer lines Septic leachfields	Sewage	There are 4 septic systems. One serves a single family dwelling, the ranger residence. One serves the maintenance and locomotive shop. The third serves the visitor center and is the only large system at the site. There is also a leachfield at the ranch house approximately 1 mile west of the park.
Fuel Tanks	gasoline	One 1100 gallon tank, above ground.
	diesel fuel	One 500 gallon tank, above ground
Maintenance shop	solvents, degreasers	Small quantities in 1-5 gallon containers.
	oil, waste oil	3-50 gallon drums and several small containers (1-5 gallons each).
	paint	Approximately 50 1-gallon cans.
Agricultural chemicals	fertilizer herbicides pesticides	Small quantities used on adjacent farm fields. Not stored or manufactured on site.

3.3 List Actual Potential Contamination Sources:

Potential contaminant sources at Golden Spike National Historic Site include the following.

1. Surface runoff entering abandoned wells
2. Effluent from septic tanks and leach fields
3. Fuel storage tanks
4. Oil and waste oil
5. Solvents and degreasers
6. Paint
7. Fertilizer, herbicides, and pesticides

3.4 Prioritize the Inventory - R309-113-10(1)

The most serious threat to groundwater resources at Golden Spike National Historic Site is surface runoff entering either of the inactive wells located near the water supply well. Runoff entering either of these wells could carry a variety of contaminants, but most likely be limited to bacteria from cow manure. These wells would provide a clear pathway from the surface to the aquifer. All other potential contaminants are used or stored in small quantities and do not have a pathway to enter the aquifer.

3.5 Potential Contamination Source Location - R309-113-10(1)

There are no potential contaminant sources in Zone 1, the area within 100 feet of the well. All potential contaminant sources listed in Table 5 are within the optional two-mile radius of the well.

3.6 Potential Contamination Sources Plotted on Map

Potential contamination sources are plotted on the map in Figure 7.

4.0 THE ASSESSMENT OF POTENTIAL CONTAMINATION SOURCE HAZARDS

There is a thick (370 feet) sequence of predominantly clay material overlying the aquifer. It is highly unlikely that any type of contaminant release at the surface would threaten the water supply of the well. The recharge area for this well is the limestone outcropping in the adjacent Promontory Mountains, predominately the mountain range to the southeast of the well. There are no potential contaminant sources in, or near, the area of limestone outcrop. Land use in the mountainous area is limited to occasional grazing.

There are no concentrated sources or large volumes of potential contaminants within two miles of the well. The area is remote and rural. Land use is primarily grazing, dryland wheat farming , and visitor use at the national park. Potential contaminants at the park are primarily associated with the maintenance and locomotive shops, including fuel storage tanks. Solvents, degreasers, paint, and similar materials (which might be classified as hazardous) are purchased and stored in small quantities, reducing the potential for release of large quantities of contaminants.

Potential contaminant sources are adequately controlled through a combination of hydrogeologic conditions and regulatory, operational, physical, and negligible quantity controls; as described in the following paragraphs of this section.

Septic leach fields have been designed and constructed according to state or local requirements. Sludge is pumped from septic tanks on a regular basis.

Spills and runoff from the maintenance shop and locomotive garage are collected in floor drains and piped to an underground tank which acts as an oil-water separator. Oil and sludge are periodically pumped and removed from the site for disposal. Water is allowed to percolate into the ground via a drainfield.

There are 4 abandoned wells within the 2-mile radius of the supply well. Each of these wells was visited to assess the potential for contaminants to enter the aquifer via the well or borehole. There is an abandoned well across the road from the visitor center. This well has the remains of an old pump jack and a drop pipe in the well. There is an opening between the pump jack and the top of the well casing. Park staff have been informed of this deficiency and the well will be capped or plugged and abandoned. A second inactive well is at the windmill on private property adjacent to the park's boneyard. This well was found to be uncapped. Park staff will cap the well and notify the owner to take appropriate corrective actions to prevent surface water from ponding around the well or entering the casing. The remaining two inactive wells are at a ranch approximately 1½ miles west of the water supply well. One well is a large diameter (approximately 5 foot) dug well located near the ranch house and is covered with planks. Topography is such that surface drainage will not enter the well. Reported depth of the well is 132 feet, placing the bottom of the well far above the aquifer supplying the park's well. The dug well probably is completed in a perched aquifer of alluvium from the North Promontory Mountain Range north and west of the ranch. The 4th well is a test well that was drilled in the mid-1990's in the northwest corner of section 6. The well apparently did not obtain an adequate water supply, as it is capped and unused. The ranch obtains its' water from a well further west, in the east central part of Section 1. Water is piped from the well to the ranch.

Agricultural chemicals (fertilizer, pesticides, and herbicides) are used on the farm fields adjacent to the park. Chemicals are not stored or manufactured at the site. Chemicals are applied according to manufacturers guidelines.

Contents of fuel storage tanks are monitored on a routine basis. Inventory is closely monitored to insure that any leaking tanks are identified quickly. Tanks are above ground. Concrete berms have been constructed to contain spills or leaks from fuel storage tanks. The tanks are scheduled to be replaced with triple wall, above ground tanks.

The park will continue to follow Best Management Practices, as described above. These practices will reduce the potential for accidental release of potential contaminants on the surface or near-surface in the vicinity of the supply well. Combined with the large thickness of clay material, these practices should provide adequate protection for the water supply well.

Potential hazards at this site are adequately controlled and no further land management strategies will be planned or implemented, unless conditions change

5.0 THE MANAGEMENT PROGRAM FOR EXISTING POTENTIAL CONTAMINATION SOURCES - R309-113-11

Current land use and land management practices are adequate to prevent accidental spill or release of potential contaminants. No additional management actions are required at this site.

6.0 THE MANAGEMENT PROGRAM FOR FUTURE POTENTIAL CONTAMINATION SOURCES - R309-113-12

6.1 Management Program - R309-113-13(4):

If there are any proposed changes to current land use and land management practices within two miles of the well, the National Park Service will review those proposed changes to determine whether the

proposed change might have a deleterious impact on the water supply for the park. No such changes are anticipated as the area is remote and rural.

6.2 Land Ownership Map - R309-113-13(2)(e):

The National Park Service owns a 160 acre tract, with the well pretty much in the center of that tract. The Park Service also owns a corridor along the old railroad grade. The remainder of the land within two miles of the well is privately owned and is used for dryland wheat farming, grazing, or set aside under the CRP (Conservation Reserve Program). Land ownership within two miles of the well is shown in Figure 7.

6.3 Land Use Agreements or Zoning Ordinances - R309-113-6(1)(n) and R309-113-13(4)(a) through (c):

All land within 1000 feet of the well is owned by the National Park Service. The Park service will not locate potential contaminant sources within Zone 1 (100 feet) around the well. Additionally, no contaminant sources will be allowed anywhere on National Park Service land unless design standards are implemented to prevent contaminant discharge.

7.0 THE IMPLEMENTATION SCHEDULE - R309-113-7(1)(e)

No new land management strategies will be implemented under this plan. The aquifer supplying water for Golden Spike National Historic Site is adequately protected by hydrogeologic conditions and existing land use management practices.

8.0 THE RESOURCE EVALUATION - R309-113-7(1)(f)

No additional financial or other resources will be required to implement this Drinking Water Source Protection Plan. All potential contaminant sources are currently adequately controlled. Hydrogeologic conditions provide further protection of the aquifer from potential contamination. Land use and ownership in this remote area virtually assures that no potential contaminant sources would ever be located within the recharge area for this well.

9.0 THE RECORDKEEPING SECTION - R309-113-7(1)(g)

This plan was developed by National Park Service staff. The plan will be reviewed and updated, as necessary, in 5 years, January, 2004.

10.0 THE CONTINGENCY PLAN - R309-113-14

There is only one well available to supply water to the system at Golden Spike National Historic Site. A specific contingency plan will only be developed if a problem arises in the future. Remedial action would depend on the source and nature of the problem. There are no other freshwater aquifers underlying the site which could be used as alternative water sources. Should the entire aquifer become contaminated, it would be necessary to pipe or truck water from some other source, several miles distant. If only a small part of the aquifer near the well is contaminated, a new well could be constructed a suitable distance away from the contaminated area.

Bottled water would be supplied to the one park residence and to park staff and visitors as necessary, should the water supply become contaminated.

References

Hood, J.W., 1966, Letter to William Fields, NPS, describing field reconnaissance trip to Golden Spike National Historic Site on August 3, 1966.

Hood, J.W., 1972, Hydrologic Reconnaissance of the Promontory Mountains Area Box Elder County, Utah, Prepared by USGS in cooperation with the Utah Department of Natural Resources, Division of Water Rights, Technical Publication No. 38, 42 pp.

Price, Don, 1968, Water Well Construction at Golden Spike National Historic Site, Box Elder County, Utah USGS Administrative Report, 19 pp.

APPENDICES

1896

CALVIN L. RAMPTON
Governor

STATE OF UTAH–DEPARTMENT OF SOCIAL SERVICES

PAUL S. ROSE
Executive Director

DIVISION OF HEALTH
44 MEDICAL DRIVE
SALT LAKE CITY, UTAH 84113
AREA CODE 801
328-6146

Board of Health
Air Conservation Committee
Health Facilities Council
Medical Examiner Committee
Nursing Home Advisory Council
Water Pollution Committee

AN J. OLSEN, M.D., M.P.H.
Director of Health

BUREAU OF ENVIRONMENTAL HEALTH
72 East 4th South
Salt Lake City, Utah

April 10, 1975

Mr. Don Hubbartt
Golden Spike National Historic Site
Promentory Star Route
Corinne, Utah 84307

Re: Chemical Analysis of Well Water
Box Elder County

Dear Mr. Hubbartt:

Enclosed is a copy of our laboratory report #75-002 covering results of a chemical analysis of a water sample from the well at the Visitors' Center located in NE 1/4 of NE 1/4 of Sec. 8, T10N, R6W, SLB&M in Box Elder County, Utah.

This report indicates the following are present in concentrations exceeding the maximum recommended concentrations prescribed in the U. S. Public Health Service Drinking Water Standards as follows:

Substance	Concentration In Sample	USPHS Maximum Recommended Conc
Total Dissolved Solids	808 mg/l	500 mg/l
Chloride	300 mg/l	250 mg/l

Because of the excessive concentrations of the above substances, this water is considered to be of marginal chemical quality for culinary use. However, no detrimental health effects would be expected to result from using water of this chemical quality.

If you have any questions, please let us know.

Sincerely,

Richard C Hansen

Richard C. Hansen
Assistant Director
Bureau of Water Quality

LPS:ndp
Enclosure
cc: Utah State Division of Water Rights
Bear River District Health Department
U. S. National Park Service (ATTN: Bert Mitchell)

75-002

ASE NOTE: Sample cannot be
lysed until all blanks are
led in (Slip must accompany
ple)

STATE OF UTAH
DEPARTMENT OF SOCIAL SERVICES
DIVISION OF HEALTH
44 MEDICAL DRIVE
SALT LAKE CITY, UTAH 84113

DO NOT WRITE HERE
Sample Received on
Analysis Authorization

WATER SAMPLE FOR CHEMICAL ANALYSIS ☒
WATER SAMPLE FOR RADIOLOGIC ANALYSIS ☐

SAMPLE COLLECTED FROM: (check one)

Stream ☐ Spring ☐ Well ☒
City or Town water distribution system ☐
Other ☒ (describe) Other- reservoir

EXACT DESCRIPTION OF SAMPLING POINT: (see note on reverse side) Taken from service sink off of culinary water service at Visitor Center

STATE ENGINEER'S APPLICATION OR CLAIM NO. 38 193

SUPPLY OWNED BY: National Park Service

PRESENT USE OF SUPPLY: Culinary

PROPOSED USE OF SUPPLY: Culinary

SAMPLE COLLECTED BY: Don Hubbartt DATE: 12/11/74

REPORT RESULTS TO: Golden Spike NHS PHONE:

Address:
Promentory Star Rt
Corine, Utah 84307

DO NOT WRITE BELOW DOUBLE LINE

RESULTS OF ANALYSIS

Turbidity	3.1	J.T.U.
Conductivity	1260	micromhos/cm
pH	6.90	
Total Dissolved Solids	808	
Alkalinity(total)as $CaCO_3$	153	mg/l
Aluminum as Al		mg/l
Arsenic as As	0.00	mg/l
Barium as Ba	0	mg/l
Bicarbonate as HCO_3	186	mg/l
Boron as B	0.18	mg/l
Cadmium as Cd	0.004	mg/l
Calcium as Ca	104	mg/l
Carbonate as CO_3	0	mg/l
Chloride as Cl	300	mg/l
Chromium(hexavalent)as Cr	0.00	mg/l
Copper as Cu	0.01	mg/l
Cyanide as CN		mg/l
Fluoride as F	0.31	mg/l
Hardness(total) as $CaCO_3$	360	mg/l
Hydroxide as OH	0	mg/l
Ammonia N as N.	0.0	

Iron (total) as Fe	0.10	mg/l
Iron in filtered sample as Fe	0.05	mg/l
Lead as Pb	0.000	mg/l
Magnesium as Mg	24	mg/l
Manganese as Mn	0.00	mg/l
Mercury as Hg	0.0	mg/l
Nitrate as N	1.90	mg/l
Nitrite as N	0.00	mg/l
Phosphate as P	0.05	mg/l
Phenols as Phenol		mg/l
Potassium as K	24	mg/l
Selenium as Se	0.000	mg/l
Silica as SiO_2	73	mg/l
Silver as Ag	0.000	mg/l
Sodium as Na	95	mg/l
Sulfate as SO_4	50	mg/l
Surfactant as MBAS	0.00	mg/l
Zinc as Zn	0.25	mg/l
Total Alpha		pci/l
Total beta		pci/l
Tritium		nci/l
Nickel, Ni.	0.008	mg/l

PLEASE PRINT

ENVIRONMENTAL CHEMISTRY WATER ANALYSIS

LAB NO:___________

WATER SYSTEM NO: 02026 SOURCE NO:________

COST CODE:________

COLLECTED BY: Steve Romero Kim Durning DATE COLLECTED: 91-12-16 TIME COLLECTED: 13:30

yy/mm/dd 24HR.CLOCK

WATER USED FOR: DRINKING: X ENVIRONMENTAL:____ OTHER:__________

EXACT DESCRIPTION OF SAMPLING POINT: WELL HOUSE

Samples Turn in to B.R.H.D 15:45 12-16-91

SEND REPORT TO: Golden Spike NHS PHONE NO: 471-2209

ADDRESS: P.O Box 897 CITY: Brigham City STATE: Ut ZIP: 84302

SAMPLE TYPE

5 CHEMISTRY ___METALS ___NUTRIENT ___BOD X RADIOLOGIC ___THM ___MAX THM ___SPEC

PARAMETERS

___BOD
___TSS
___TKN
___TOC
___COD
___TDS @180°C

___Cyanide*
___Phenolics*
___Sulfide*
___Oil & Grease*
___pH

RADIOLOGICAL
___Alpha, Gross
___Beta, Gross
___^{226}Radium
___^{228}Radium
___Uranium

DISSOLVED METALS

___Arsenic
___Barium
___Boron
___Cadmium
___Chromium
___Calcium
___Copper
___Iron

___Lead
___Magnesium
___Manganese
___Nickel
___Potassium
___Selenium
___Silver
___Sodium
___Zinc

ANIONS

___Bicarbonate
___Carbon Dioxide
___Carbonate
___Chloride
___CO_3Solids
___Fluoride
___Hydroxide
___Nitrate & Nitrite
___Silica
___Sulfate

TOTAL METALS

___Aluminum
___Arsenic
___Barium
___Beryllium
___Cadmium
___Chromium
___Cobalt
___Copper
___Iron

___Lead
___Manganese
___Mercury
___Molybdenum
___Nickel
___Selenium
___Silver
___Vanadium
___Zinc

SAMPLE MUST BE FILTERED IN THE FIELD FOR DISSOLVED TESTS

___Total Phosphorus
___Total Alk. as $CaCO_3$
___Total Hardness as $CaCO_3$
___Turbidity as NTU
___Sp. Cond (umhos/cm)
___Ammonia
___Other:__________

* Special bottles must be used to run these tests.

TESTING WILL NOT BE PERFORMED UNLESS SLIP IS COMPLETELY FILLED OUT AND PROPER CONTAINERS ARE USED. CONTAINERS ARE AVAILABLE FROM THE LAB OR LOCAL DISTRICT HEALTH DEPARTMENTS.

BY APPOINTMENT ONLY

___Nitrate
___Nitrite
___Phosphorus, Ortho
___Chromium, Hex

LAB USE ONLY: 1-2-3-4-5-6-7-8-9-10-11
12-13-14-15-16-17-18-19-20-21-22-23
24-25-26-27-28-29-30-31-32-33-34-35
36-37-38-39-40-41-42-43-44-45-46-47
48-49-50-51-52-53-54-55-56-57-58-59
60-61-62-63-64-65-66-67-68-69-70

STATE OF UTAH DEPT. OF HEALTH
DIVISION OF LABORATORY SERVICES
46 North MEDICAL DRIVE
SALT LAKE CITY, UTAH 84113
(801)584-8400

EPA METHOD 502.2 GC

Purgeables

Send Report To: (PLEASE PRINT)
Name or Agency: GOLDEN Spike NHS
Address: P.O. Box 897
City,State,Zip: Brigham City Ut 84302
Phone Number: 471-2209
WATER USED FOR: DRINKING: X
OTHER:

LAB NO.
STATE OF UTAH. DEPT.OF HEALTH
DIVISION OF LABORATORY SERVICES
46 North MEDICAL DRIVE
Salt Lake City,Ut. 84113
(801)584-8400
COST CODE

Samples turned in to BRHD 1545 12-16-91

Field #
Date Collected: 91-12-16
Time Collected(24 hr.clock): 13:30
Collected By: S. Romero /K. Duering
Sampling Site: WELL HOUSE

Analyst
Date Rec'd
Date Analyzed
Amt.Purged (MDL based on 5ml purge vol.)
Dilution

MARK WITH AN X BELOW WHICH LISTS YOU NEED TESTED

List 1 Monitoring Required

	ug/L
1,1-Dichloropropene	0.05U
1,1-Dichloroethane	0.06U
1,1,1,2-Tetrachloroethane	0.5U
1,1,2-Trichloroethane	0.01U
1,1,2,2-Tetrachloroethane	0.5U
1,2-Dichloropropane	0.5U
1,2,3,-Trichloropropane	0.09U
1,3-Dichloropropane	0.05U
1,3-Dichloropropene	0.5U
2,2-dichloropropane	0.5U
Bromobenzene	0.05U
Bromodichloromethane	0.09U
Bromoform	1.9U
Bromomethane	0.5U
Chlorobenzene	0.06U
Chlorodibromomethane	0.22U
Chloroethane	0.5U
Chloroform	0.04U
Chloromethane	0.5U
cis-1,2-Dichloroethylene	0.09U
Dibromomethane	0.5U
Dichloromethane	0.5U
Ethylbenzene	0.11U
m-Dichlorobenzene	0.06U
m-Xylene	0.07U
o-Chlorotoluene	0.10 U
o-Dichlorobenzene	0.09U
o-Xylene	0.07U
p-Chlorotoluene	0.10 U
p-Xylene	0.07U
Styrene	0.5U
Tetrachloroethylene	0.7U
Toluene	0.06U
trans-1,2-Dichloroethylene	0.5U

Regulated VOCs

	ug/L
Vinyl Chloride	0.10U
Benzene	0.04U
Carbon Tetrachloride	0.09U
1,2-Dichloroethane	0.14U
Trichloroethylene	0.11U
1,1-Dichloroethylene	0.09U
p-Dichlorobenzene	0.05U
1,1,1-Trichloroethane	0.09U

List 2 Req.for Vulnerable Systems

	ug/L
Ethylene dibromide (EDB)	0.04U
1,2-Dibromo-3-Chloropropane	0.04U

U-Analyzed for but not detected.
J-An estimated value or a value less than the detection limit but greater than zero
B-Found in the blank

List 3 State's Discretion

	ug/L
1,2,3-Trichlorobenzene	0.5U
1,2,4-Trichlorobenzene	0.12U
1,2,4-Trimethylbenzene	0.09U
1,3,5-Trimethylbenzene	0.09U
Bromochloromethane	0.5U
n-Butylbenzene	0.13U
Dichlorodifluoromethane	0.5U
Fluorotrichloromethane	0.07U
Hexachlorobutadiene	0.18U
Isopropylbenzene	0.09U
p-Isopropyltoluene	0.5U
Napthalene	0.5U
n-Propylbenzene	0.10U
sec-Butylbenzene	0.12U
tert-Butylbenzene	0.5U

Analysis Certified By:
Date

Lab use only:
1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32
33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61

BOTTLES REQUIRED: (4) 40 ml GLASS VIALS
NO HEADSPACE-LID MUST BE TEFLON LINED

WELL HOUSE
GOLDEN SPIKE N.H.S.
P.O.BOX 897
BRIGHAM CITY UT 84302 471-2209

UTAH STATE HEALTH LABORATORY
Environmental Chemistry Analysis Report

scription: WELL HOUSE
e ID: 02026 Source: 00
t Code: 3618
Number: 9108381 Type: 04
nple Date: 91/12/16 Time: 13:30
. Cations:
. Anions: mg/l Cations: me/l
and Total: mg/l Anions: me/l

Date of Review and QA Validation
Inorganic Review:
Organic Review: 92/01/03
Radiochemistry Review: 92/01/15
Microbiology Review:

---

oratory Analyses

L-pH *	7.6	T.Sus.Sol *	<3 mg/l
2+NO3, N	1.948 mg/l	Ammonia N	<0.05 mg/l
-Calcium	100 mg/l	D-Magnesum	34 mg/l
Potassum	24 mg/l	D-Sodium	100 mg/l
carbnate	168 mg/l	Carb. Diox	5 mg/l
arbonate	0 mg/l	Chloride	329.9 mg/l
Fluoride	0.504 mg/l	Hydroxide	0 mg/l
Sulfate	42 mg/l	T. Phos.	<0.01 mg/l
ot. Alk.	137 mg/l	T. Hardns.	389.4 mg/l
urbidity	4.3 NTU	L-Sp. Cond	1290 umhos
S @ 180C *	866 mg/l	T-Arsenic	<5.0 ug/l
T-Barium	0.14 mg/l	T-Cadmium	<1 ug/l
Chromium	<5.0 ug/l	T-Copper	<20.0 ug/l
T-Iron	0.84 mg/l	T-Lead	<5.0 ug/l
T-Mangan	18.0 ug/l	T-Mercury	<0.2 ug/l
Selenium	<5.0 ug/l	T-Silver	<2.0 ug/l
T-Zinc	220.0 ug/l	Alpha, grs	<2 pc/l
3 Solids	82.0 mg/l		

DS Holding time was exceeded before analysis was completed
SS Holding time was exceeded before analysis was completed
H pH should be performed as a field test.

DOES NOT EXCEED
DRINKING WATER
STANDARDS

[illegible] please call the Bureau of Drinking Water/

SE PRINT

ENV NMENTAL CHEMISTRY WATER ANALYS

Dec 17 91 008381

LAB NO: ____

WATER SYSTEM NO: 02026 SOURCE NO: ____

COST CODE: 36 / B

COLLECTED BY: Steve Romero DATE COLLECTED: 91-12-16 TIME COLLECTED: 13:30

Kim Durring

yy/mm/dd 24HR.CLOCK

WATER USED FOR: DRINKING: X ENVIRONMENTAL: ____ OTHER: ____

EXACT DESCRIPTION OF SAMPLING POINT: WELL HOUSE

SEND REPORT TO: Golden Spike NHS PHONE NO: 471-2209

ADDRESS: P.O Box 897 CITY: Brigham City STATE: Ut ZIP: 84302

SAMPLE TYPE

5 CHEMISTRY ___METALS ___NUTRIENT ___BOD 1X RADIOLOGIC ___THM ___MAX THM ___SPEC

PARAMETERS

___BOD
___TSS
___TKN
___TOC
___COD
___TDS @180°C

___Cyanide*
___Phenolics*
___Sulfide*
___Oil & Grease*
___pH

RADIOLOGICAL
___Alpha, Gross
___Beta, Gross
___^{226}Radium
___^{228}Radium
___Uranium

DISSOLVED METALS

___Arsenic
___Barium
___Boron
___Cadmium
___Chromium
___Calcium
___Copper
___Iron

___Lead
___Magnesium
___Manganese
___Nickel
___Potassium
___Selenium
___Silver
___Sodium
___Zinc

ANIONS

___Bicarbonate
___Carbon Dioxide
___Carbonate
___Chloride
___CO_3Solids
___Fluoride
___Hydroxide
___Nitrate & Nitrite
___Silica
___Sulfate

TOTAL METALS

___Aluminum
___Arsenic
___Barium
___Beryllium
___Cadmium
___Chromium
___Cobalt
___Copper
___Iron

___Lead
___Manganese
___Mercury
___Molybdenum
___Nickel
___Selenium
___Silver
___Vanadium
___Zinc

SAMPLE MUST BE FILTERED IN THE FIELD FOR DISSOLVED TESTS

___Total Phosphorus
___Total Alk. as $CaCO_3$
___Total Hardness as $CaCO_3$
___Turbidity as NTU
___Sp. Cond (umhos/cm)
___Ammonia
___Other: ____

BY APPOINTMENT ONLY
___Nitrate
___Nitrite
___Phosphorus, Ortho
___Chromium, Hex

* Special bottles must be used to run these tests.

LAB USE ONLY: 1-2-3-4-5-6-7-8-9-10-11
12-13-14-15-16-17-18-19-20-21-22-23
24-25-26-27-28-29-30-31-32-33-34-35
36-37-38-39-40-41-42-43-44-45-46-47
48-49-50-51-52-53-54-55-56-57-58-59
60-61-62-63-64-65-66-67-68-69-70

TESTING WILL NOT BE PERFORMED UNLESS SLIP IS COMPLETELY FILLED OUT AND PROPER CONTAINERS ARE USED. CONTAINERS ARE AVAILABLE FROM THE LAB OR LOCAL DISTRICT HEALTH DEPARTMENTS.

STATE OF UTAH DEPT. OF HEALTH
DIVISION OF LABORATORY SERVICES
46 North MEDICAL DRIVE
SALT LAKE CITY, UTAH 84113
(801)584-8400

UTAH STATE HEALTH DEPARTMENT
DIVISION OF LABORATORY SERVICES
Environmental Chemistry Analysis Report

TAP AT THE WELL HEAD
GOLDEN SPIKE N.H.S.
P.O. BOX 897
BRIGHAM CITY UT 84302
801-471-2209

Description: TAP AT THE WELL HEAD
Site ID: 02026 Source: 00
Cost Code: 361B
Lab Number: 9312973 Type: 04
Sample Date: 93/12/21 Time: 08:40
Tot. Cations: 257
Tot. Anions: 438 mg/l Cations: 12.7 me/l
Grand Total: 695 mg/l Anions: 12.6 me/l

Date of Review and QA Validation
Inorganic Review: 94/01/27
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

L-pH	7.2	T.Sus.Sol	<3.0 mg/l
NO2+NO3, N ⊗	2.156 mg/l	Cyanide	<0.02 mg/l
Ammonia N	<0.05 mg/l	D-Calcium	100 mg/l
D-Magnesum	34 mg/l	D-Potassum	24 mg/l
D-Sodium	99.0 mg/l	Bicarbnate	172 mg/l
Carb. Diox	17 mg/l	Carbonate	0 mg/l
Chloride	324.9 mg/l	Fluoride	0.511 mg/l
Hydroxide	0 mg/l	Sulfate	29.411 mg/l
T. Phos.	0.012 mg/l	Tot. Alk.	141 mg/l
T. Hardns.	389.4 mg/l	Turbidity	0.75 NTU
L-Sp. Cond	1355 umhos	TDS @ 180C *	834 mg/l
T-Arsenic	5.0 ug/l	T-Barium	0.12 mg/l
T-Berylium	<1 ug/l	T-Cadmium	<1 ug/l
T-Chromium	<5.0 ug/l	T-Copper	<20.0 ug/l
T-Iron	0.08 mg/l	T-Lead	<3.0 ug/l
T-Mangan	6.6 ug/l	T-Mercury	0.2 ug/l
T Nickel	<10.0 ug/l	T-Selenium	1.0 ug/l
T-Silver	<2.0 ug/l	T-Zinc	410.0 ug/l
T-Antimony	<3.0 ug/l	T-Thallium	<1.0 ug/l
CO3 Solids	84 mg/l		

TDS Holding time was exceeded before analysis was completed.

⊗RESULT INCONCLUSIVE
$NO_2 + NO_3 \geq 0.50$ mg/L
EXPLANATION OF RULE:
Div. Drinking Water 538-6159
ARRANGE NITRITE ANALYSIS:
Sample Receiving 584-8459

Primary, Secondary G&M.

UTAH STATE HEALTH DEPARTMENT
DIVISION OF LABORATORY SERVICES
Environmental Chemistry Analysis Report

WELL HEAD
GOLDEN SPIKE NATIONAL HISTORIC SITE
P.O.BOX 897
BRIGHAM CITY UT 84302 471-2209

Description: WELL HEAD
Site ID: 02026 Source: 00
Cost Code: 361B
Lab Number: 9401378 Type: 04
Sample Date: 94/03/02 Time: 07:45
Tot. Cations:
Tot. Anions: 4 mg/l Cations: me/l
Grand Total: 4 mg/l Anions: 0.1 me/l

Date of Review and QA Validation
Inorganic Review: 94/03/04
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Nitrite N 0.894 mg/l

EXCEEDS PRIMARY DRINKING WATER STANDARD(S) FOR NITRATE ACTION ACTION LEVEL: 0.50 mg/L **CALL YOUR LOCAL HEALTH DEPT. FOR FURTHER INFORMATION.**

For consultation or assistance, please call the Bureau of Drinking Water/ Sanitation at 538-6159

536-4200

BINNING DRILLING CO.

LESTER BINNING
227 SOUTH 4TH WEST
PHONE 465-3622 OR 754-3238

PAYSON, UTAH 84651

June 3, 1967

Billing For Payment of Contract No. 14-10-7-973-66
Project No. Wr-1
Golden Spike Natl. Historic Site

Billing to: Office of Land and Water Rights
450 Golden Gate Avenue, Box 36063
San Francisco, California, 94102

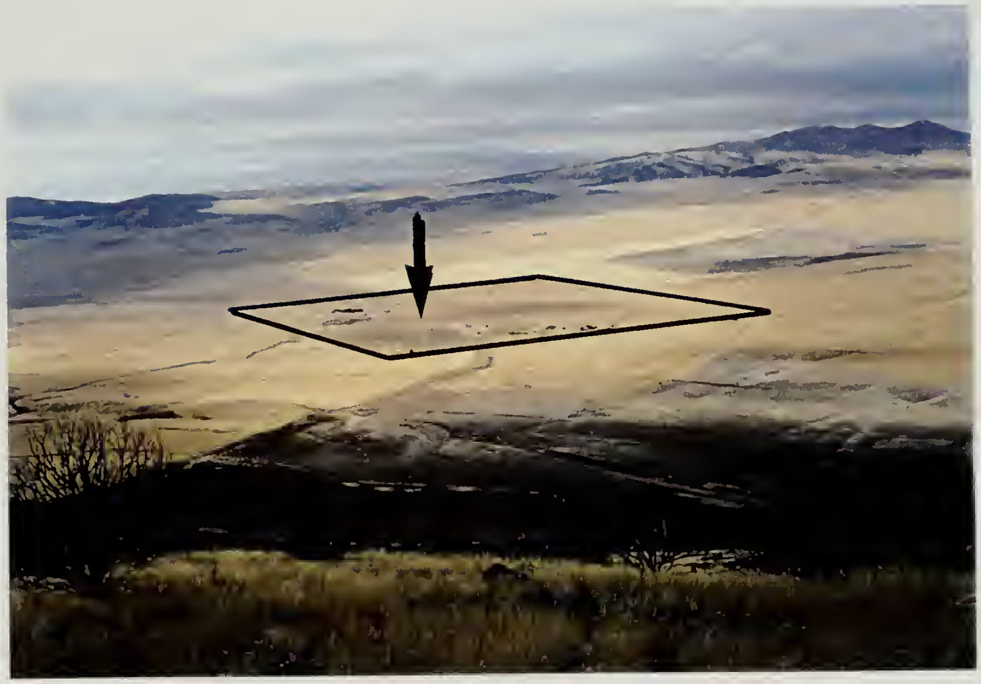
ITEM NO.		
1.	Moving equipment to and from site	$ 400.00
L.B. 3.	Drilling of 8" hole 423' @ $6.00 per ft.	2,538.00
7.	425' of 6" casing installed @ $3.00 per ft.	1,275.00
9.	8 hrs. bailing test @ $14.00 per hour	112.00
10.	60 hrs pumping test @ $25.00 per hour	1,500.00
12.	20 hrs developing well @ $14.00 per hour	280.00
13.	10' of reaming hole to 14" from 0' to 10' and placing concrete around casing	140.00
L.B. 14.	~~4 ½~~ 5 xxxxx of standby time @ $50.00 per day days	250.00
		$6,495.00

Lester Binning
Lester Binning contractor

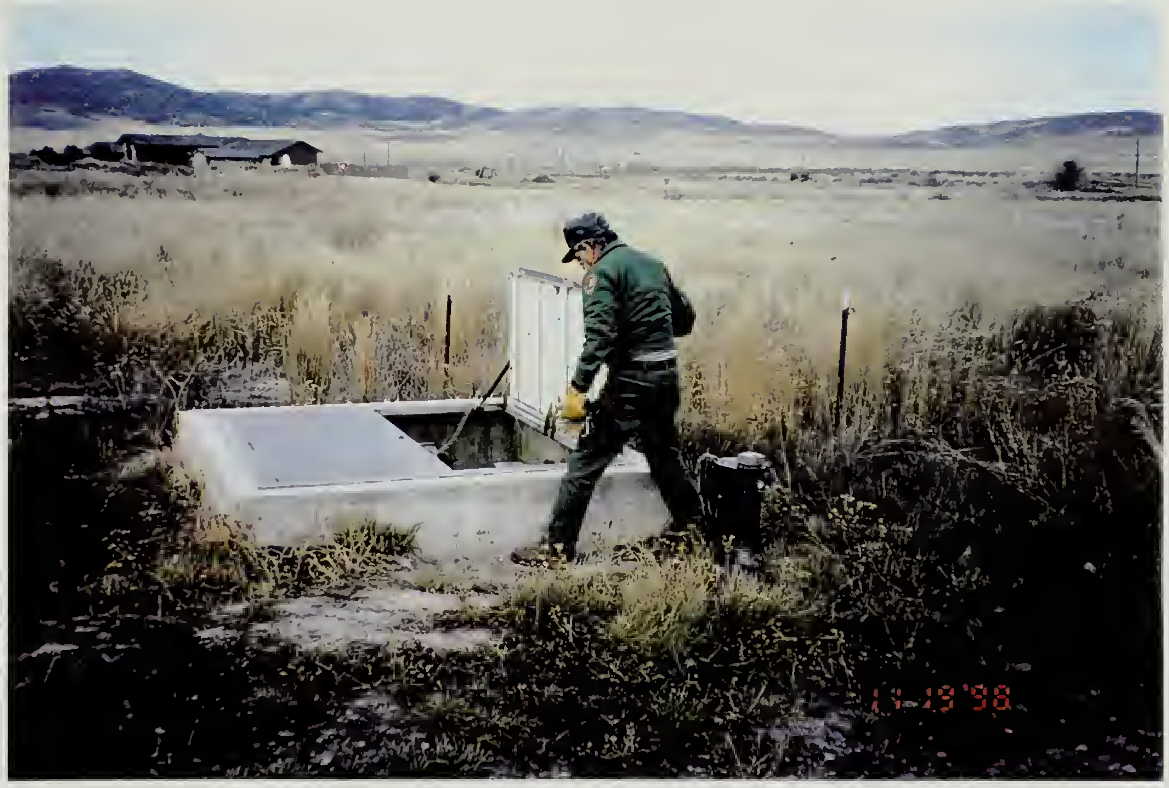
Supt. William Krueger

William E. Fields

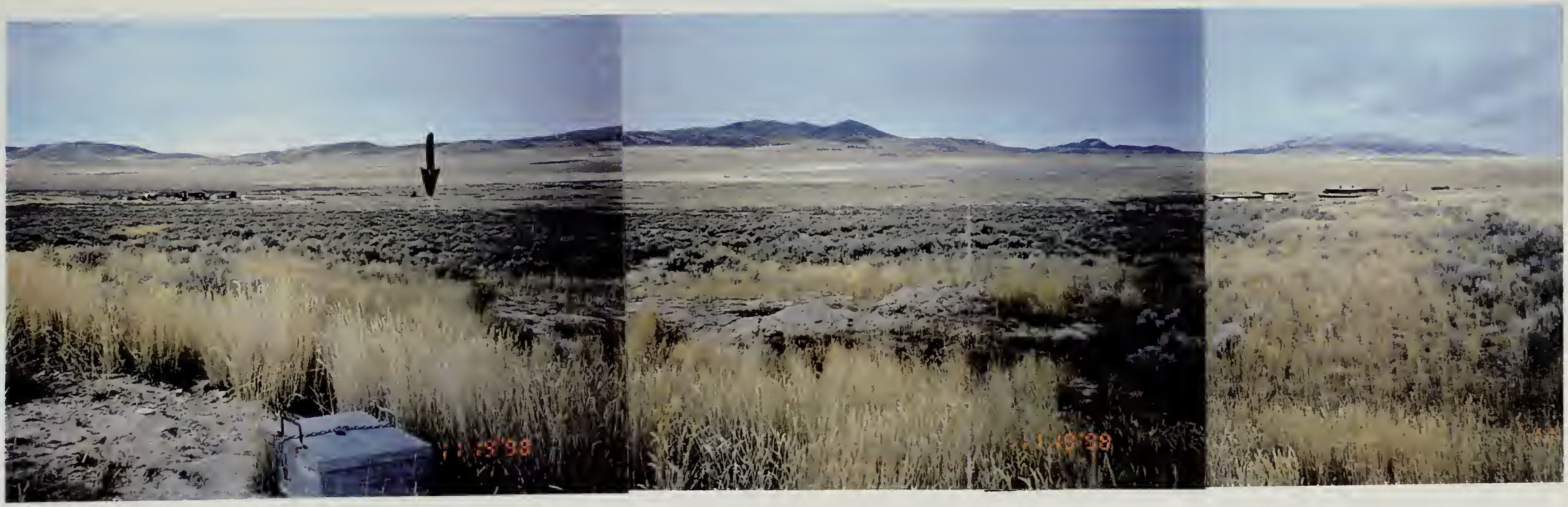
View toward the southeast from about 2 miles northwest of park headquarters. Park facilities are barely discernible as a dark area in the center of the photo, at the base of the Promontory Mountains. The snow-capped peaks in the background are the Wasatch Range.



View toward the northwest from atop the Promontory Mountains. The 160 acre tract owned by the National Park Service is outlined with a heavy black line. Location of the water supply well is indicated by the arrow.



Water supply well and pit containing controls and chlorinator. Visitor Center and Headquarters building in the background is approximately 1000 feet to the northwest.



Panorama from the buried water storage tank. View is toward the northwest (left of photo) through north (center of photo) and northeast (right of photo). Visitor Center and Headquarters is at the left of the photo, ranger residence, maintenance shop, and locomotive shop on the right. Approximate location of the well is indicated by the arrow.